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Guidance and Control System (GC) - Malfunction Procedure Symptoms and hand drawn diagrams

National Aeronautics and Space Administration (NASA)

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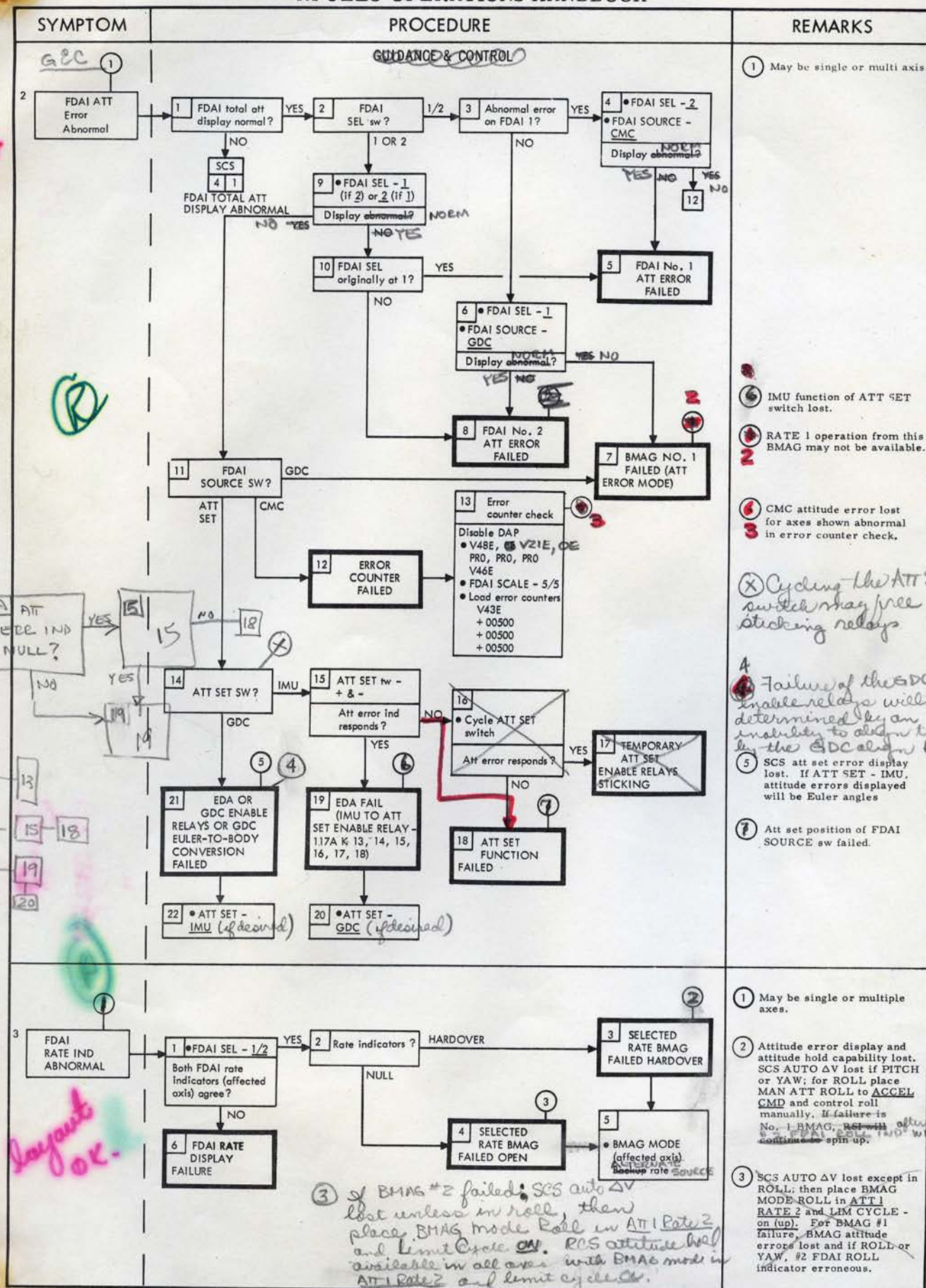
National Aeronautics and Space Administration (NASA), "Guidance and Control System (GC) - Malfunction Procedure Symptoms and hand drawn diagrams" (1968). *Apollo One Investigation Materials*. 30.
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SM2A-03-SC 101-(2)
APOLLO OPERATIONS HANDBOOK

SWIGERT
PUEBLO FILE

G&C
MALFUNCTION



Basic Date

Change Date

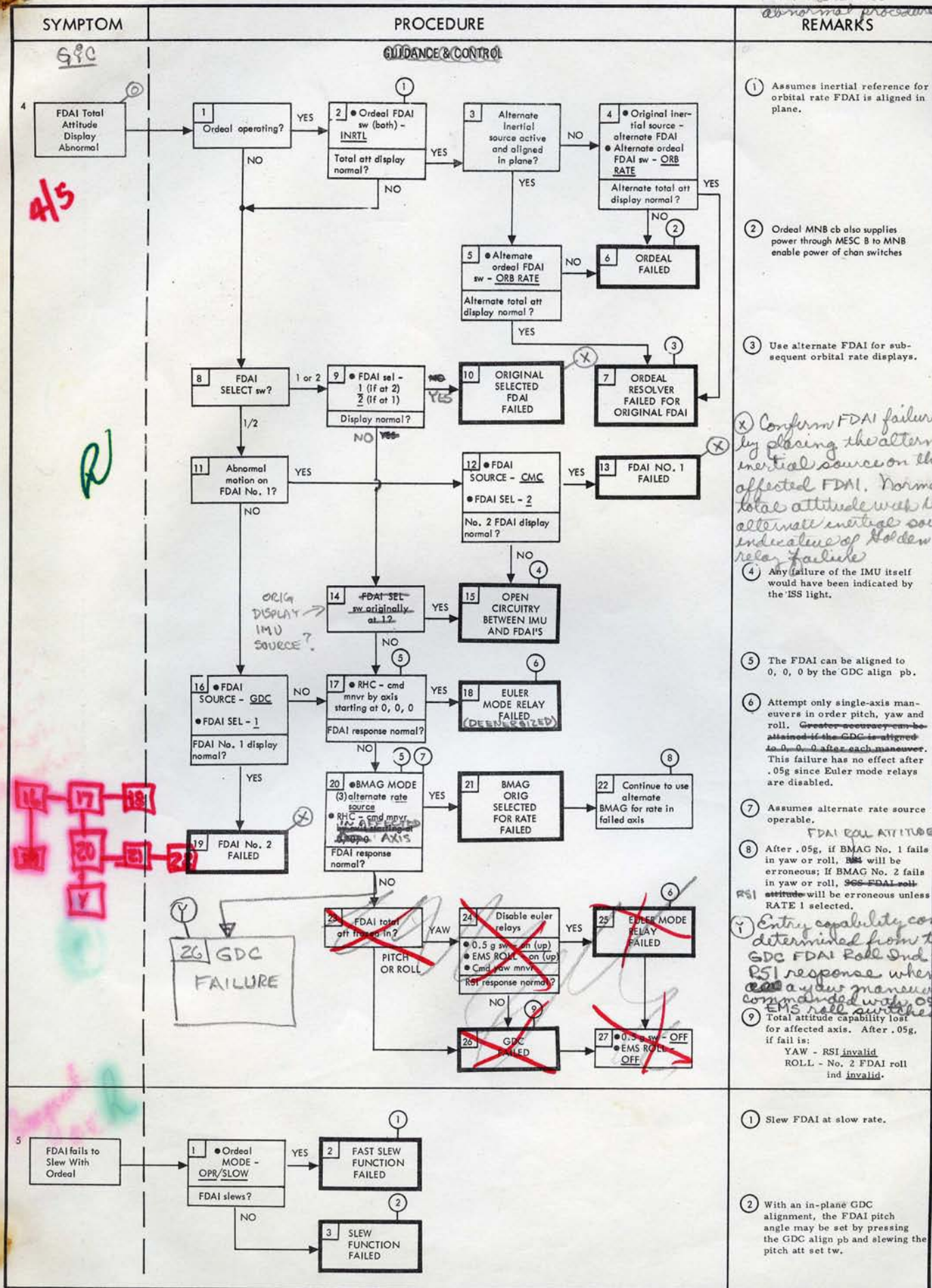
Page

SM-2A-1547A

SM2A-03-SC101-(2)
APOLLO OPERATIONS HANDBOOK

① For GDC FDAI TOTAL ATTITUDE, if Rate display (e) also hardware, enter FDI rate and abnormal procedure

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MALFUNCTION



SM2A-03-SC101-(2)
APOLLO OPERATIONS HANDBOOK

SYMPTOM	PROCEDURE	REMARKS
<p>①</p> <p>12 FDAI TOTAL ATT DOES NOT RESPOND TO GDC ALIGN</p> <p><i>LAYOUT OK (condense vertically if required)</i></p> <p>②</p>	<p><i>TOTAL ATTITUDE DISPLAY NORMAL?</i></p> <p>1 • RHC - CMD - small - mvr</p> <p>Total attitude responds normally?</p> <p>YES → 2 • FDAI SOURCE - ATT SET</p> <p>2 FDAI indicates att error in axis?</p> <p>YES → 3 GDC ALIGN FUNCTION LOST</p> <p>NO → 4 GDC ALIGN/ ATT SET ENABLE FUNCTION LOST</p> <p>NO → SCS 48</p> <p>FDAI TOTAL ATT DISPLAY ABNORMAL</p> <p><i>Hand Nozzle will look in space arrangement? mission rule for high press</i></p>	<p>① May be single or multiple axes.</p> <p>② Att set error displays still operational.</p> <p>③ GDC can be aligned to an arbitrary position by:</p> <ol style="list-style-type: none"> Fly the SC to the indicated attitude to which the GDC is to be aligned. Disable the GDC. Fly the SC to the prescribed inertial attitude (star or visual reference). Re-enable the GDC. <p><i>MSFN has redundant sensor</i></p>
<p>13 GPI/FUEL PRESS IND(S) PEGGED OR ZERO</p> <p><i>LAYOUT OK (condense vertically if required)</i></p> <p>②</p>	<p>1 Both inds (of pair) pegged or zero?</p> <p>YES → 4 Ind usage for fuel press?</p> <p>YES → 5 MSFN verifies abnormal pressure?</p> <p>YES → 8 S - IVB TANK PRESSURE ABNORMAL</p> <p>NO → 6 SIGNAL CONDITIONER POWER SUPPLY FAILED → 7 Utilize MSFN to monitor tank pressures</p> <p>NO → 9 SPS firing?</p> <p>NO → 10 TVC GMBL DR 1 FAILED (AFFECTED AXIS) → 11 TVC GMBL DR (affected axis) - 2</p> <p>YES → 12 FDAI total attitude, error, rates normal?</p> <p>YES → 13 DISPLAY FAILED → 14 Continue burn. Monitor FDAI rates and attitude error.</p> <p>NO → SCS 81</p> <p>ABNORMAL DYNAMICS DURING SPS THRUSTING</p>	<p>① THC - CW or TVC GMBL DR (2) - 2, Continue normal activities using redundant TVC loop for control.</p>

G&C
MALFUNCTION

Memo to Walt

after Sep - pull RCS logic MNA FMB cbo. - until
ready to heat CM engines or RCS transfer

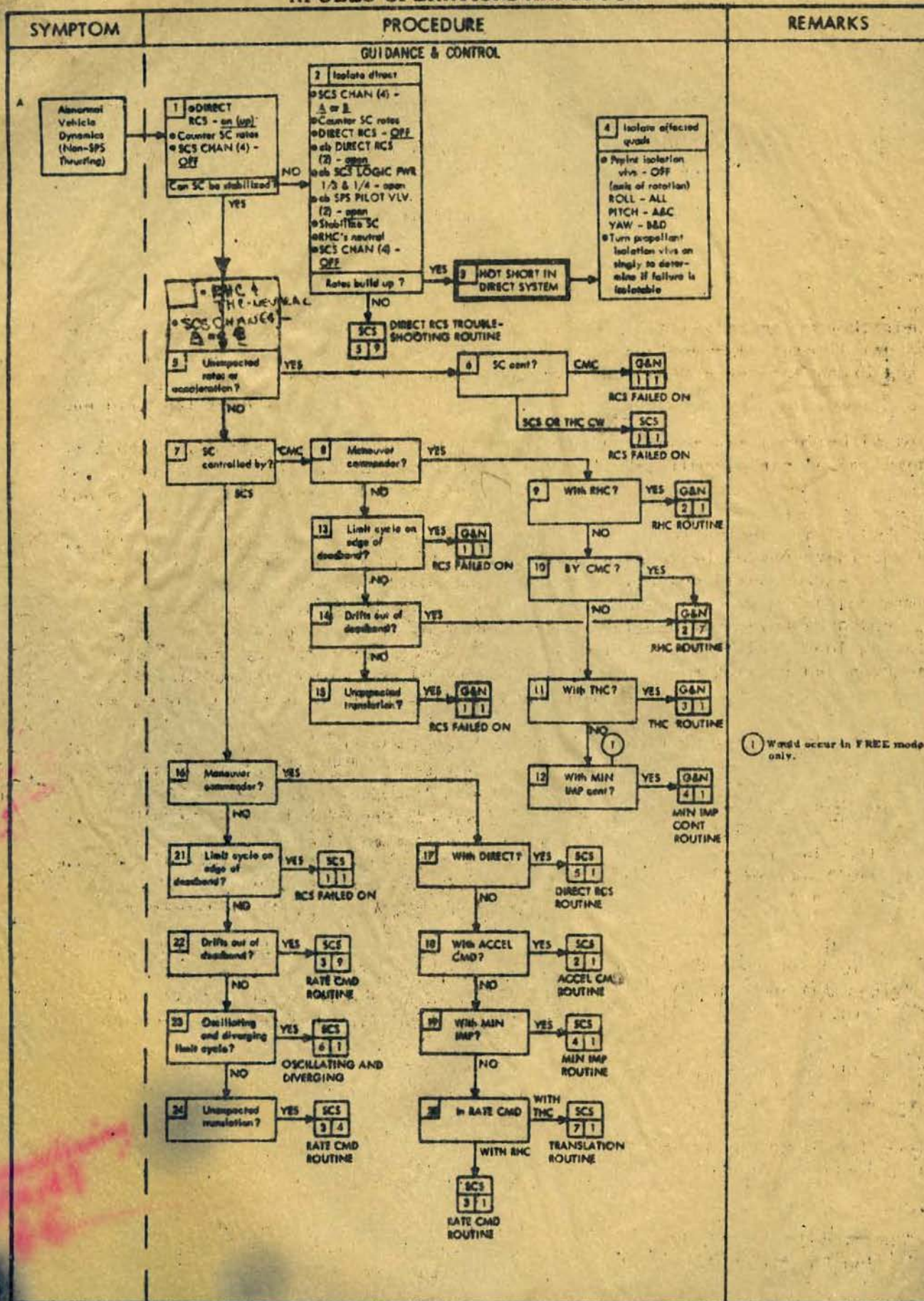
2353
2716

Turned
to
switch
position
for
engine

after 05g
#1 YAW
#1 ROLL
ATI 1/DATE
FDAL ROK
#2 YAW -> RSI
#2 ROLL ->

Turned
to
switch
position
for
engine

SM2A-03-SC 10 1-(2)
APOLLO OPERATIONS HANDBOOK



Basic Date

1 March 1968

Change Date

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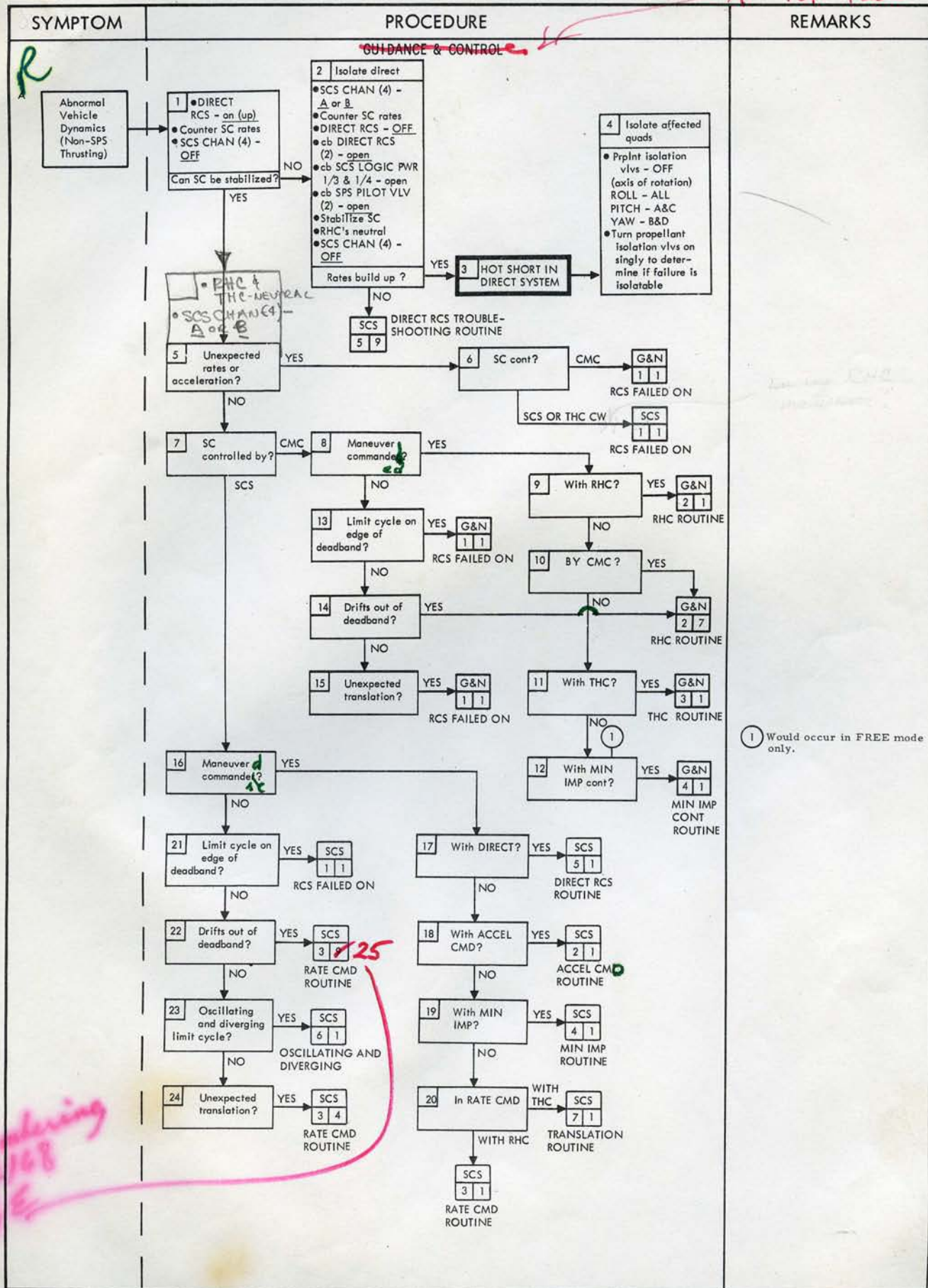
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Should be later

SM2A-03-SC 101-(2)
APOLLO OPERATIONS HANDBOOK

NO TITLE ON THIS ONE - IT'S FOR SCS A "TOP FLOW"

G&C
MALFUNCTION



Basic Date

1 March 1968

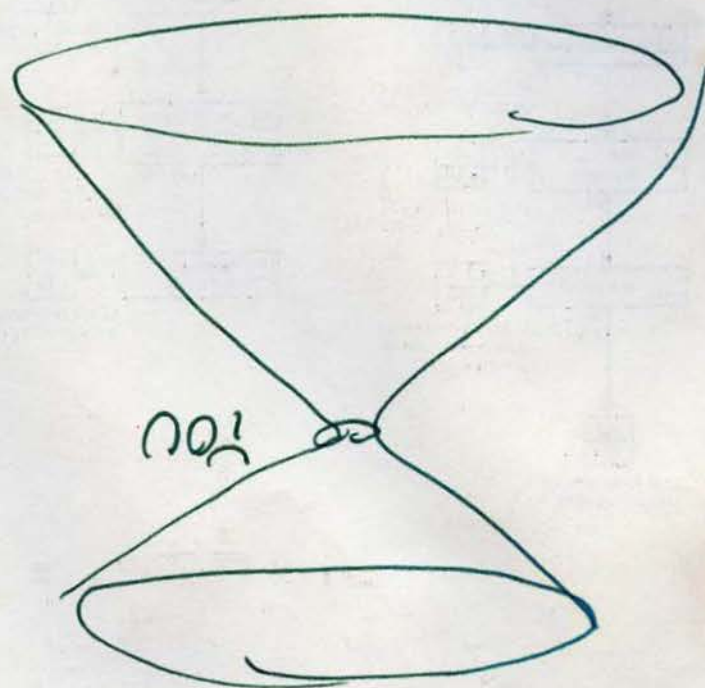
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Should be later

Remembering
4/12/68
B.E.



no 1

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Save for
Swigerts
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SYMPTOM	PROCEDURE	REMARKS
1. 929.4 EXTENSIVE VELOCITY ERRORS IN PITCH OR YAW	<p>1. SCS CHAN (A) - OFF DIRECT RCS - ON STABILIZE SC WITH DIRECT PROBLEM OCCURRED DURING?</p> <p>2. CHECK INSTRUMENTS AND DISPLAYS</p> <p>3. CHECK RATE DISPLAYS FOR • RATE 1 • RATE 2 • RATE 3 • RATE 4 • RATE 5 • RATE 6 • RATE 7 • RATE 8 • RATE 9 • RATE 10 • RATE 11 • RATE 12 • RATE 13 • RATE 14 • RATE 15 • RATE 16 • RATE 17 • RATE 18 • RATE 19 • RATE 20 • RATE 21 • RATE 22 • RATE 23 • RATE 24 • RATE 25 • RATE 26 • RATE 27 • RATE 28 • RATE 29 • RATE 30 • RATE 31 • RATE 32 • RATE 33 • RATE 34 • RATE 35 • RATE 36 • RATE 37 • RATE 38 • RATE 39 • RATE 40 • RATE 41 • RATE 42 • RATE 43 • RATE 44 • RATE 45 • RATE 46 • RATE 47 • RATE 48 • RATE 49 • RATE 50 • RATE 51 • RATE 52 • RATE 53 • RATE 54 • RATE 55 • RATE 56 • RATE 57 • RATE 58 • RATE 59 • RATE 60 • RATE 61 • RATE 62 • RATE 63 • RATE 64 • RATE 65 • RATE 66 • RATE 67 • RATE 68 • RATE 69 • RATE 70 • RATE 71 • RATE 72 • RATE 73 • RATE 74 • RATE 75 • RATE 76 • RATE 77 • RATE 78 • RATE 79 • RATE 80 • RATE 81 • RATE 82 • RATE 83 • RATE 84 • RATE 85 • RATE 86 • RATE 87 • RATE 88 • RATE 89 • RATE 90 • RATE 91 • RATE 92 • RATE 93 • RATE 94 • RATE 95 • RATE 96 • RATE 97 • RATE 98 • RATE 99 • RATE 100</p> <p>4. CHECK INSTRUMENTS AND DISPLAYS</p> <p>5. CHECK INSTRUMENTS AND DISPLAYS</p> <p>6. CHECK INSTRUMENTS AND DISPLAYS</p> <p>7. CHECK INSTRUMENTS AND DISPLAYS</p> <p>8. CHECK INSTRUMENTS AND DISPLAYS</p> <p>9. CHECK INSTRUMENTS AND DISPLAYS</p> <p>10. CHECK INSTRUMENTS AND DISPLAYS</p> <p>11. CHECK INSTRUMENTS AND DISPLAYS</p> <p>12. CHECK INSTRUMENTS AND DISPLAYS</p> <p>13. CHECK INSTRUMENTS AND DISPLAYS</p> <p>14. CHECK INSTRUMENTS AND DISPLAYS</p> <p>15. CHECK INSTRUMENTS AND DISPLAYS</p> <p>16. CHECK INSTRUMENTS AND DISPLAYS</p> <p>17. CHECK INSTRUMENTS AND DISPLAYS</p> <p>18. CHECK INSTRUMENTS AND DISPLAYS</p> <p>19. CHECK INSTRUMENTS AND DISPLAYS</p> <p>20. CHECK INSTRUMENTS AND DISPLAYS</p> <p>21. CHECK INSTRUMENTS AND DISPLAYS</p> <p>22. CHECK INSTRUMENTS AND DISPLAYS</p> <p>23. CHECK INSTRUMENTS AND DISPLAYS</p> <p>24. CHECK INSTRUMENTS AND DISPLAYS</p> <p>25. CHECK INSTRUMENTS AND DISPLAYS</p> <p>26. CHECK INSTRUMENTS AND DISPLAYS</p> <p>27. 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CHECK INSTRUMENTS AND DISPLAYS</p> <p>97. CHECK INSTRUMENTS AND DISPLAYS</p> <p>98. CHECK INSTRUMENTS AND DISPLAYS</p> <p>99. CHECK INSTRUMENTS AND DISPLAYS</p> <p>100. CHECK INSTRUMENTS AND DISPLAYS</p>	<p>1. Thrust is shut off before initiating translates waiting.</p> <p>2. CMD 4V capability lost</p> <p>3. Auto optics lost</p> <p>4. SCS AUTO 4V lost MTVC possible if redundant RCS placed in RATE position.</p> <p>5. SCS AUTO 4V lost of PITCH or YAW. Roll, control attitude with DIRECT or ACCEL AND.</p> <p>6. Improper rate BHAG may be compensated by null roll display. SCS Auto 4V and Rate 2 ATTVC lost. SCS base drive lost in ATT Rate 2 or Rate 2. SCS error open. Check if yaw or roll unless SCS Auto 4V cap.</p> <p>7. SCS RATE CMD, ATT and and proportional control lost for affected axis. SCS AUTO 4V lost of PITCH or YAW. Transla- tions without ATT HOLD possible in MIN IMP. Further troubleshooting not recommended.</p> <p>8. ATT HOLD capability lost in affected axis. SCS AUTO 4V lost if PITCH or YAW.</p> <p>9. For affected axis: in ATT 1, RATE 2, ATT HOLD and ATT error display lost. After SCS FDAI roll att error of YAW or ROLL.</p> <p>10. SCS AUTO 4V and MTVC functions lost in both pitch and yaw. In MTVC the gimbal position directly follows the stick position (no stick integrator).</p>

G&N	MALFUNCTION
SCS	MALFUNCTION
SPS	MALFUNCTION
RCS	MALFUNCTION
EPS	MALFUNCTION
T/C	MALFUNCTION
ECS	MALFUNCTION
SEQ	MALFUNCTION

22

GEC

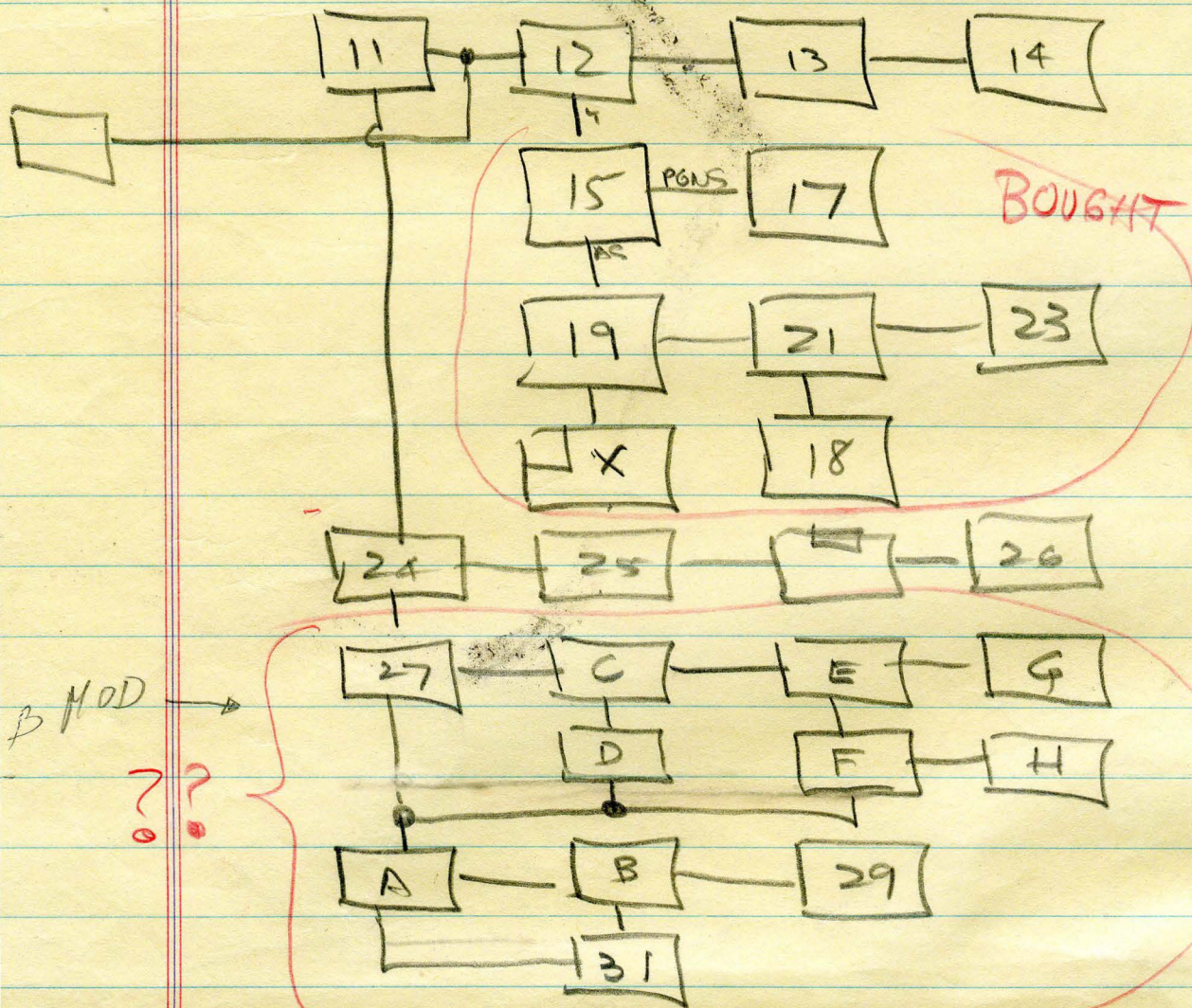
TVC procedure
4-9-68

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Hiroshima File

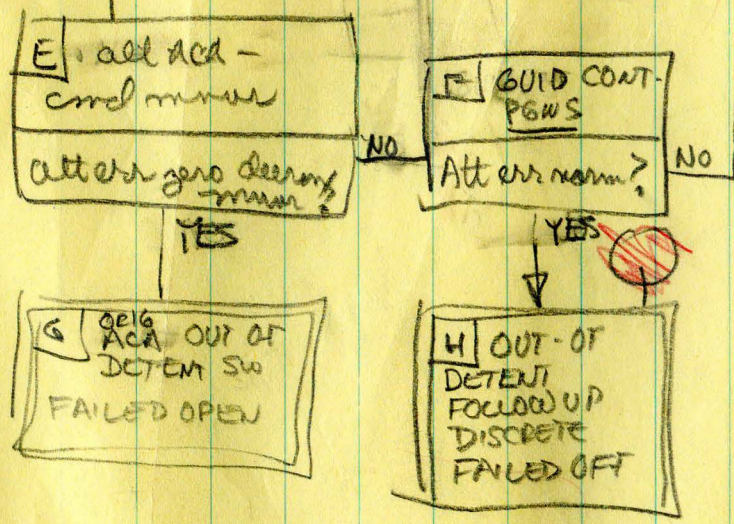
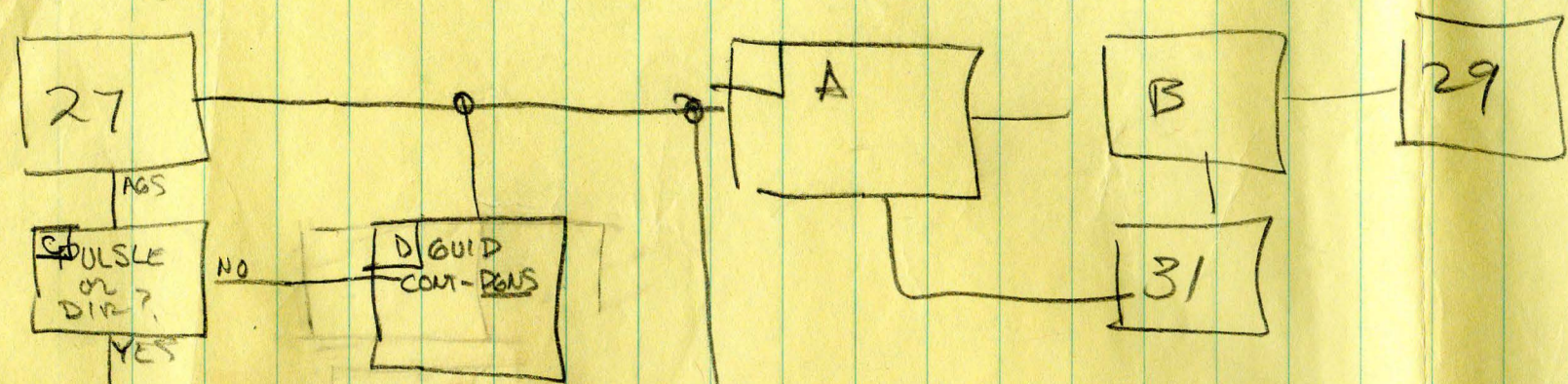
GEC section
Boards were reviewed
from these notes.

OVERVIEW

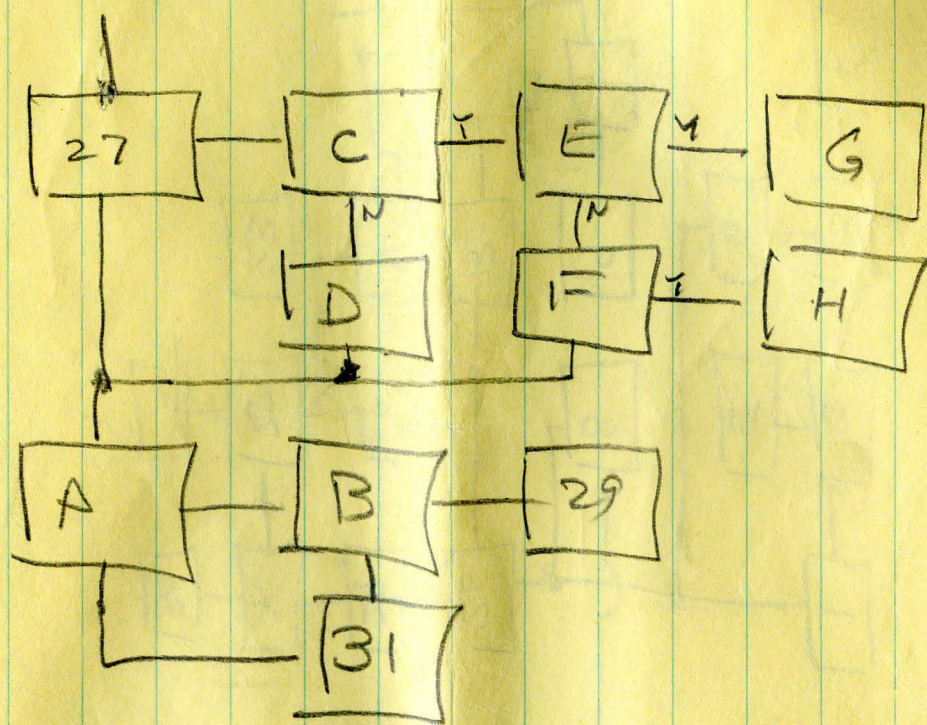
Disp #1

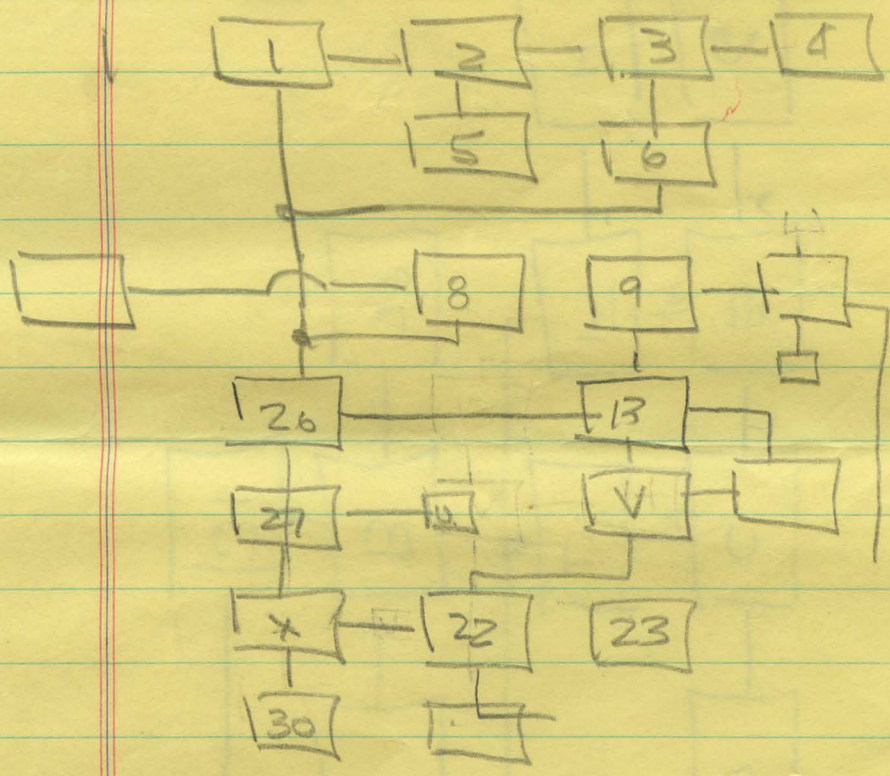


(BMOD)



not
Add X





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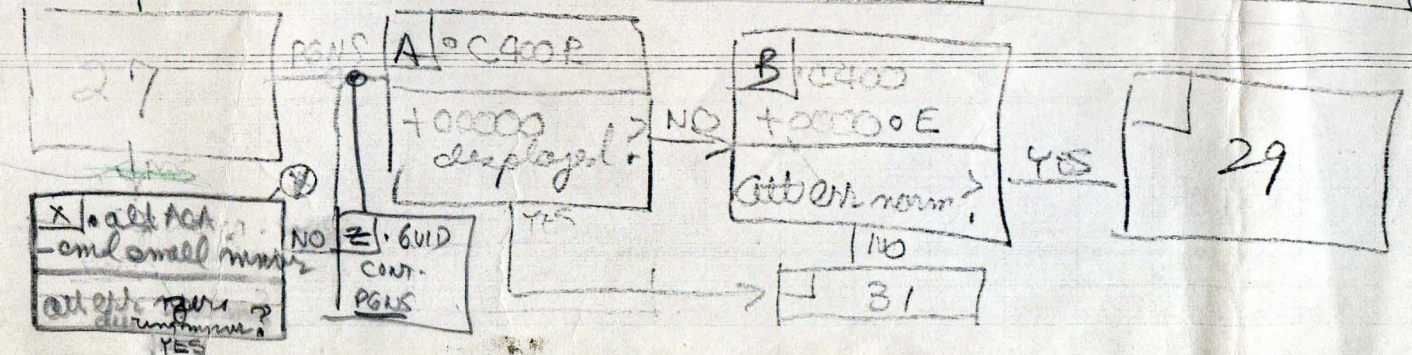
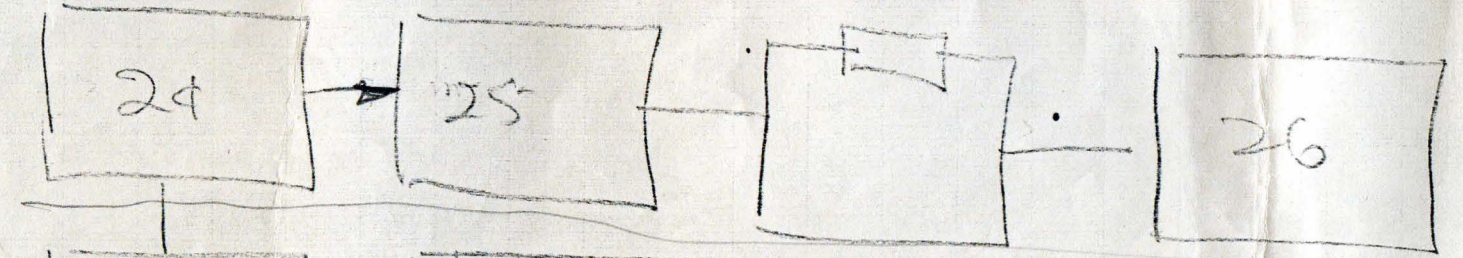
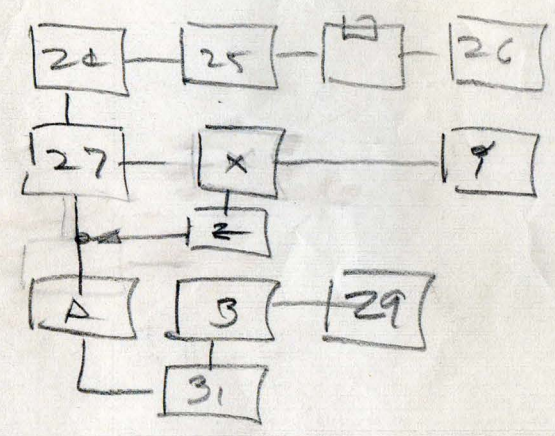
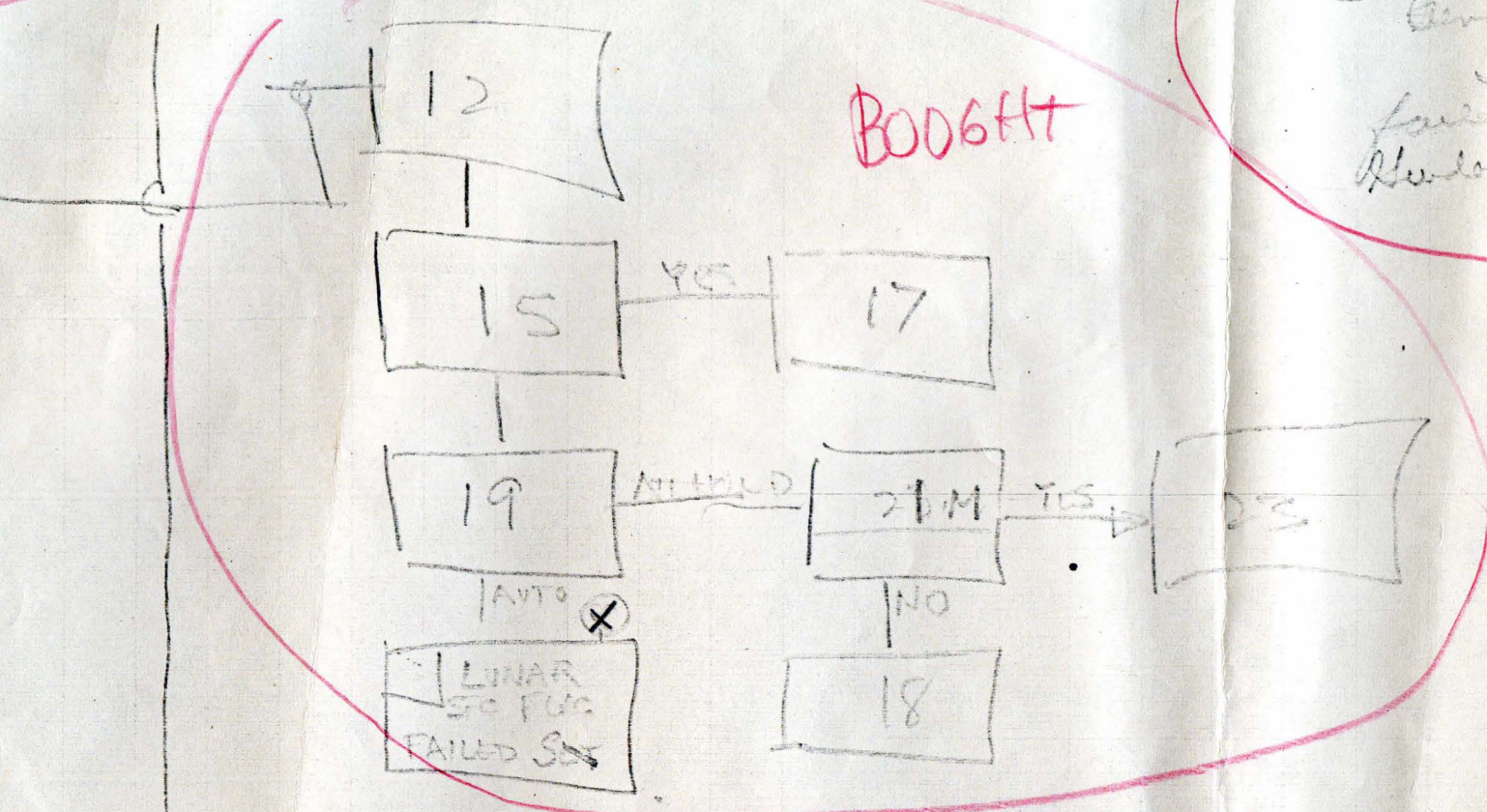
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(A MOD)

BOUGHT

⊗ Check and reset
Server STC flag.
If server soft flag
failed, SGS lost
Redundant clearing.

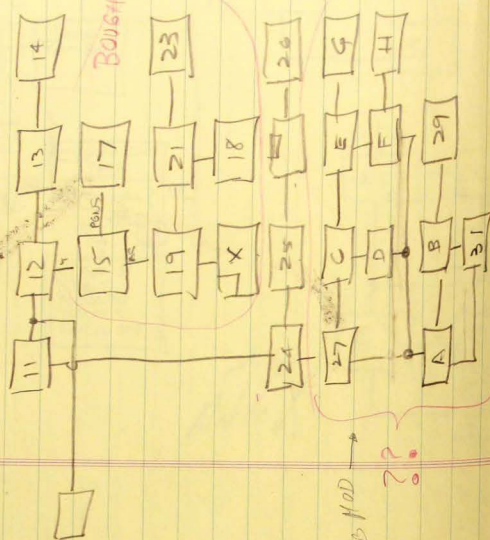
BOUGHT



⊗ out of file!
out of problem
result in stream
control response (except pulse in
direct?)

GPC Displays

J. Wright's copy.



UGAT

REMARKS

G&N MALFUNCTION

SCS
MALFUNCTION

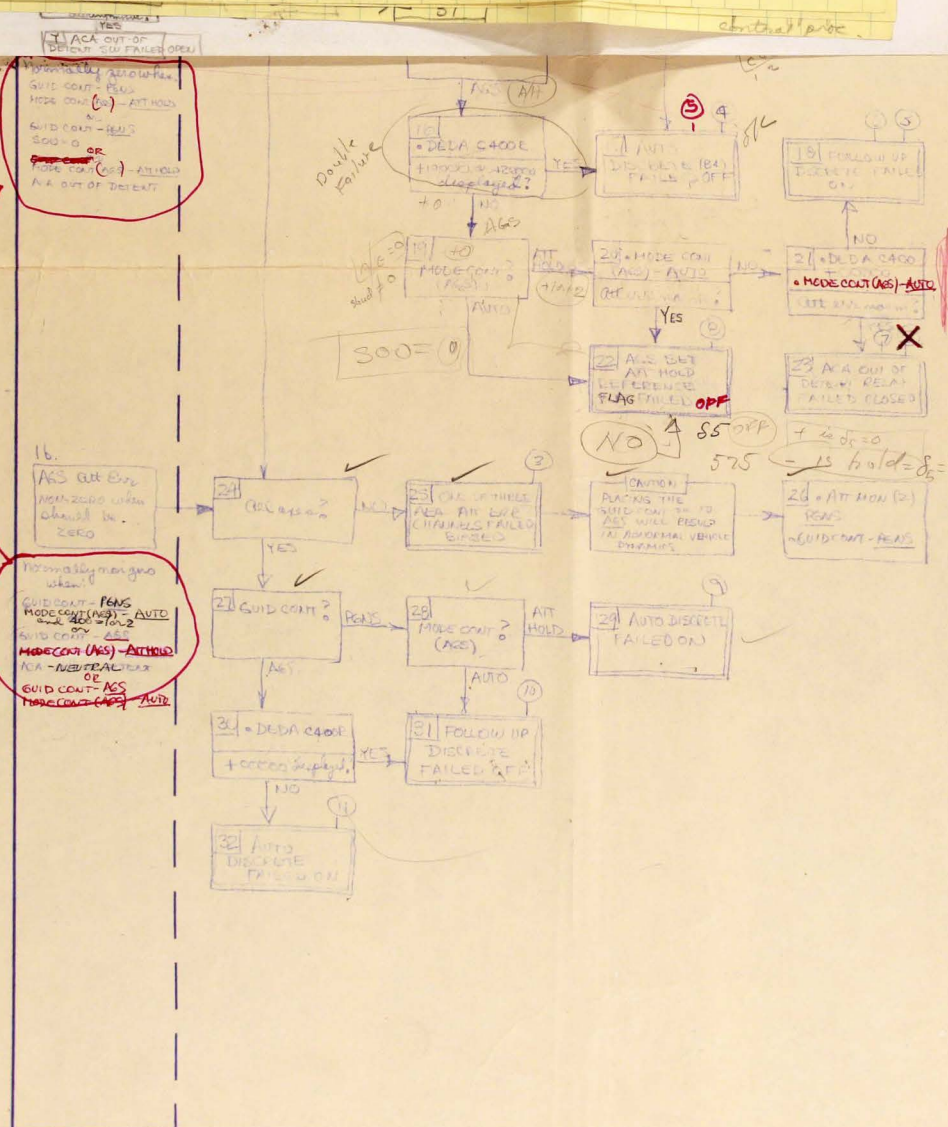
SPS MALFUNCTION

RCS MALFUNCTION

EPS MALFUNCTION

T/C
WALFUNCTIONECS
WALFUNCTION

SEQ MALFUNCTION



- 4) AGS will not compute
answers to test test
- 5) AGS does not do any
at HPS test. AGS
computations are
except for all error.
- 6) For AGS test, name
open test test
- 7) AGS will not compute
answers to test test
- 8) ~~AGS will not compute
answers to test test~~
- 9) ~~AGS will not compute
answers to test test~~
- 10) Capability to change AGS
attitude and involve
reference with AGS test
- 11) AGS will not compute
answers to test test

Inputs

FCSD	✓
FOP	✓
GAEC	✓
E3D	✓
Crew	

[illegible]

Inputs

FCSD	✓
FOP	✓
GAEC	✓
E3D	✓
Crew	